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Arizona Corporation Commission

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JAN 29 2016

January 29, 2016

Docket Control
Arizona Corporation Commission
1200 West Washington
Phoenix, Arizona 85007



RE: SWAT-AZ Ten Year Snapshot Study for 2016 Biennial Electric Transmission Assessment
2016- 2025. Docket No. E-00000D-15-0001

Dear Sir/Madam:

The Southwest Area Transmission (SWAT) Sub-Regional Transmission Planning Group is comprised of transmission regulators/governmental entities, transmission users, transmission owners, transmission providers, transmission operators, transmission developers, generation developers, and environmental entities. The group was formed to promote regional planning across the entire Southwest area of the Western Electricity Coordinating Council. SWAT operates in a public forum and is open to any entity or persons interested in the development and future of the electric transmission system. SWAT encourages collaborative efforts and joint participation to address issues. A key goal of SWAT is to maximize use and benefits of the existing and future regional transmission system.

As members of SWAT, the Arizona Transmission Providers have participated in various SWAT Technical Subcommittees, Task Forces, Work Groups and the Oversight Committee. The Subcommittees, Task Forces, and Work Groups have been involved in study efforts investigating renewable energy resources such as solar and wind energy, new base load generation, transmission to access renewable resources, how to meet load growth and enhance the utilization of the existing transmission system, and coordination with neighboring Sub-Regional Planning Groups. Due to the nature of performing joint study work, Arizona Transmission Providers are dependent on the technical studies performed under the direction of SWAT for development of their Ten Year Plans.

The attached study work was prepared by the SWAT subcommittee, Arizona Transmission System (SWAT-AZ), and was approved at its January 28, 2016 meeting. The report has been prepared to support Transmission Provider's Ten Year Plan submittals in January 2016 and for use during the ACC's 2016 Biennial Transmission Assessment (BTA).

SWAT Studies for 2016 Biennial Electric Transmission Assessment 2016-2025
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The SWAT-AZ 2016 Ten Year Snapshot Study fulfills the BTA requirement to study ten-year transmission plan projects submitted to the ACC and includes "Project Outage" (formerly known as N-1-1) analysis, for the state of Arizona.

SWAT strongly supports the coordinated effort between the utilities and stakeholders and supports the enclosed study report.

Sincerely,

A handwritten signature in black ink, reading "H. Patrick Harwood". The signature is fluid and cursive, with the first name "H." and last name "Harwood" clearly legible.

Patrick Harwood
SWAT Chairman

Enclosure

cc: Thomas M. Broderick, Utilities Division, (ACC)
Janice Alward, Esq., Legal Division (ACC)
Dwight Nodes, Chief Administrative Law Judge, Hearing Division (ACC)
Toby Little (ACC)
Zachary Baumann (SRP)
Boris Tumarin (SWTC)
Gary Trent (TEP)
Jason Spitzkoff (APS)

Original and 13 copies of the foregoing filed with Docket Control.

January 28, 2016

2016 Ten Year Snapshot Study

A report to address Arizona Corporation Commission Biennial Transmission Assessment (BTA) requirements



SWAT-Arizona Subcommittee

Chairman: Patrick Harwood

*Study work performed by Salt River Project and Arizona
Public Service*

Executive Summary

The Ten Year Snapshot Study is an assessment of the Arizona transmission system based upon submittals to the Arizona Corporation Commission (ACC) per Arizona Revised Statutes § 40-360.02.C.7. The Ten Year Snapshot Study is performed every two years and reviewed as part of the Arizona Corporation Commission's (ACC) Biennial Transmission Assessment (BTA) per Arizona Revised Statutes § 40-360.02.G.

The submitted ten year plans are modeled in a power flow case representing the expected transmission system in 2025. The 2025 Heavy Summer Western Electricity Coordinating Council (WECC) base case was used as the seed base case. Forecasted loads, resources, underlying transmission system, as well as planned facilities for transmission owners in the 2025 timeframe were added to the WECC case to develop the Arizona transmission system case used in this study.

The assessment of the ten year plan consisted of conducting N-0 and N-1 power flow analyses on the coordinated case to verify that there were no thermal overloads or voltage problems with the planned facilities in service during the ten year time frame. Project outage (N-1-1) power flow analyses were conducted to show the impact on the surrounding transmission system by removing an individual project from the ten year plan.

Prior to any outages (N-0 conditions), the base case showed a single bus outside of voltage criteria and no BES facility exceeding thermal ratings. Single contingency (N-1) analysis showed a single bus with voltage deviation concerns and the Saguaro East – Marana and Three Points – Sandario 115kV lines overloaded for several outages.¹ The study also found a single outage which resulted in a no-solve.

The project outage (N-1-1) portion of the study involved taking out facilities associated with a ten year planned project and running contingencies. Four project outages were studied: two Arizona Public Service (APS) projects and two Salt River Project (SRP) projects. No reliability issues were identified as a result of a delay or cancellation of any of these projects. This analysis showed that delay of a single project would not cause significant negative impact to the remaining transmission system.

This study indicated the planned 2025 Arizona transmission system is robust, as shown by the few instances of localized voltage and thermal violations in the base case. The project outage scenarios indicated that a delay of any one project did not have a significant negative impact on the remaining transmission system. It should be noted that delay of projects investigated in this study beyond their in-service dates may not impact the Arizona BES transmission system, but it could have significant impacts on underlying local load-serving facilities.

¹ These overloads can be resolved with generation redispatch.

2016 Ten Year Snapshot Study

A report to address Biennial Transmission Assessment (BTA) requirements

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Introduction

The Ten Year Snapshot Study is performed every two years to coincide with biennial filings with the ACC. The Ten Year Snapshot Study is a collaborative effort to assess the ten year transmission plan for Arizona.

The objective of the study is to analyze how the participants' ten year plans perform as a whole in a regional environment, and the effect of omitting an individual planned transmission project from the plan.

The transmission system performance is assessed by studying N-0, N-1 and project outage (N-1-1) conditions on a transmission system topography, load level, and generation dispatch forecasted in a tenth year. The study consisted of a screening of voltage and thermal violations for N-0, N-1, and the project outage scenarios. The system performance is assessed by reviewing thermal and voltage violations under all lines in service and outage conditions. The violations are identified if thermal or voltage excursions exceed criteria determined by the North American Electric Reliability Corporation (NERC) transmission planning (TPL) standards, which are detailed in Appendix B of this report.

This report is one of a series of reports required to be filed with the ACC on a biennial basis as a result of Orders issued by the ACC from previous Biennial Transmission Assessments. Other required reports, such as the Corridor Outage and Extreme Contingencies studies, will be submitted separately.

Study Methodology

Case building

The study began with development of a power flow case that reflected a 2025 timeframe and included participants' Ten Year Plan projects. Entities planning to build either transmission of 100kV or greater or generation of 100MW or greater must file a Ten Year Plan with the ACC annually.

The study work began with reviewing the system with all lines in service. Overloads or voltage violations in Arizona and California were corrected to alleviate any issues due to errors in the case.

Case Highlights for Arizona

Generation

The generation capacity modeled for Arizona was 34,356MW with 27,874MW online.

Load

Arizona was modeled with 22,430MW of load for this 2025 representation. The previous report modeled 23,535MW of load for 2023. Losses account for an additional 613MW for a total Arizona load (load + losses) of 23,043MW.

State Status

The 2025 Heavy Summer case showed Arizona generating 4,831MW more than required to serve Arizona loads. Arizona continued to export generation primarily to California.

N-1 and Project Outage (N-1-1) Contingency Analysis

Once a case was finalized, contingency analysis was performed. Contingency analysis (also known as N-1 analysis) simulates taking an element out of service (forced outage, fire, storm damage, etc.) and assessing the impact to the remainder of the system due to the loss of that facility. The utilities reviewed the resultant violations and provided mitigation, if available.

The last step of the study was the project outage analysis (also known as N-1-1) which resulted in nine additional cases. Each project outage case removed a project (transmission facility/ies) and single contingencies were applied to the new base topology. The following project outages were considered for this analysis:

APS01	North Gila – Orchard (TS8) 230kV line <ul style="list-style-type: none"> • North Gila – Orchard 230kV line • North Gila 500/230 kV transformer 	2021
APS02	Morgan – Sun Valley 500kV line <ul style="list-style-type: none"> • Morgan – Sun Valley 500kV line 	2018
SRP01	RS-28 230/69kV Substation and RS-28 – Schrader 230kV line <ul style="list-style-type: none"> • RS-28 230/69kV Substation • RS-28 – Schrader 230kV Line 	2017
SRP02	Browning – Corbell 230kV and Santan – Rogers 230kV line reconfiguration <ul style="list-style-type: none"> • Browning – Corbell 230kV line • Santan – Rogers 230kV Line • (Browning – Rogers 230kV Line put back in service) 	2020

Table 1 – Project Outage Cases²

For more information on the status or milestones of these projects visit the Arizona Corporation Commission website, Docket Control, to obtain Ten Year Plan filings or visit project proponent websites.

Monitoring Criteria

This analysis monitors thermal loading of transmission facilities and voltage deviation at substations caused by system disturbances (contingencies). The criteria in Table 3- Monitoring criteria below highlights the criteria used to identify violations for this study. Exceeding the criteria below can cause damage to the electric system. Elements that exceed the criteria indicate where problems in the system may exist and that need further review to appropriately address the thermal or voltage deviation issue. The voltage and thermal criteria are the proposed WECC criteria, which have the following limits:

² TEP and SWTC did not have any planned project outages to consider for this analysis.

N-0	No outage, all lines in service	No element exceeding 100% of its normal rating	Less than 0.95 or greater than 1.05 ³ of nominal voltage
N-1	Single element outage	No element exceeding 100% of its emergency rating	No voltage deviation greater than 8%
Project Outage (N-1-1)	Project outage (with system adjustments) followed by another contingency	Reducing loadings to 100% (or less) of normal rating following the removal of a project and 100% or less of the emergency rating for the subsequent outage	No voltage deviation greater than 8%

Table 2 - Monitoring criteria

All thermal overloads and voltage results were screened to show only elements 115kV and above. Voltage deviation is calculated as the percent difference between post- and pre-outage bus voltage. If the voltage deviation exceeds 8%, the bus is listed as exceeding criteria.

The project outage (N-1-1) thermal overload results were benchmarked against the N-1 results to distinguish loadings that were only associated with the N-1-1 and were not pre-existing in the N-1 base case. Similarly, the N-1-1 voltage deviation results were also benchmarked against N-1 results.

Monitored Elements

All transmission facilities in Arizona with voltage greater than or equal to 115kV were monitored against thermal and voltage criteria as described in the previous section titled "Monitoring Criteria".

System Disturbances (Contingencies)

The contingencies studied included Arizona transmission lines and transformers with voltages equal to or greater than 115kV. The list of contingencies is contained in Appendix A.

³ Arizona utilities typically screen for voltage below 0.95 per unit and above 1.05 per unit on all systems less than 500kV. The 500kV system is typically operated at 525kV which results in a per unit voltage acceptable up to 1.10 per unit.

Study Results

Base case results

The 2025 Heavy Summer case results included voltage and thermal violations with all lines in service (no contingencies) as well as voltage, thermal, and no-solve concerns under simulated contingency conditions.

The 2025 Heavy Summer case showed no thermal violations (flow on elements exceeding an element's normal rating) under all lines in service conditions. For single element outages studied, the Saguaro East – Marana and Three Points – Sandario 115kV lines overloaded for several outages.^{4 5}

The base case contained a single bus with low voltage at PD-Morenci. There were no buses identified as exceeding voltage deviation criteria.⁶ However, there is a single outage that resulted in a no-solve, as listed below:⁷

- Marana – Saguaro 115kV (Breaker to Breaker)

Tabular results are contained in Appendix B.

Project outage followed by single contingency (N-1-1)

The project outage analysis is a screening tool to assist in identifying the criticality of projects to the interconnected system if not in service at the end of the ten year timeframe.

There were no voltage violations or voltage deviations for the project outage scenarios that didn't occur in the base case.

Project outage cases showed no thermal violations under all lines in service conditions. For single element outages studied, the Saguaro East – Marana and Three Points – Sandario 115kV lines overloaded for several outages. All of these thermal overloads were pre-existing in the 2025 Heavy Summer base case, and none of the overloads increased significantly.

A single no-solve from the 2025 Heavy Summer base case remained in the project outage cases.

Results are contained in Appendix B.

⁴ These overloads are currently being investigated and mitigations, if required, will be incorporated into future 10 year plans. One possible mitigation is the ED-5 – Saguaro – Marana 115 kV bypass of Saguaro to become ED-5 – Marana 115 kV.

⁵ These overloads can be resolved with generation redispatch

⁶ The Redtail 230 kV substation shows up in the results because it is at exactly 8% deviation. Further, Redtail 230 kV is not a load-serving bus and not subject to the 8% deviation criteria.

⁷ Affected utilities have been contacted to resolve these no-solves.

Conclusions

The Ten Year Snapshot Study investigated the coordinated impact of ten year plans on the Arizona extra high voltage (EHV) system and found that:

- The 2025 system is robust
- Planned projects support the loads estimated for the 2025 timeframe

The project outage analysis (an N-1-1 analysis) indicated that the delay of any one project beyond the 2025 timeframe does not result in any thermal or voltage violations that were not already present in the base case.

As a screening analysis, the project outage portion of the Ten Year Snapshot Study indicated that the EHV system can support changes in the timing of some of the transmission and generation projects without significant adverse effects on the remaining system.

The results indicate limited reliability impact from the removal of any of the studied projects. These limited reliability impacts are an indicator that the system is robust, not that a project is unnecessary. This is because utilities plan their transmission systems for reliability, redundancy, transmission scheduling capability, and economic considerations. This ten year snapshot is intended to view the combined impact of a state-wide collaboration of projects that perhaps individual utilities might not see when planning for the near term (five to six years). Because planned projects are modeled in this longer term view, and with the interconnected nature of the transmission system, removal of a single project results in redistribution of power on the remaining projects and system. This redistribution reduces the impact of the delay of an individual project, but should not suggest a lack of need for that individual project. The delay of other projects investigated in this study beyond their in-service dates may not impact the Arizona transmission system, but could have significant impacts on underlying load-serving facilities. In addition, this study does not analyze the transmission scheduling capability of projects, which are the driving factors for some of the projects.

This study indicates that the planned 2025 Arizona transmission system is robust, as shown by the few instances of localized voltage and thermal violations in the base case. The project outage scenarios indicate that a delay of any one project does not have a significant negative impact on the overall reliability of the remaining transmission system.

Appendices

Appendix A: Contingency List

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# Contingency Selection Criteria: From area 14 to 14; 229 kV to 999 kV
# Contingency Selection Criteria: From area 14 to 14; 229 kV to 999 kV
line_1      "Line SAN_JUAN      345.0 to MCKINLEY      345.0 Circuit 1"      1.000
line      10292      16102      "1 "      1 0
0
line_2      "Line SAN_JUAN      345.0 to MCKINLEY      345.0 Circuit 2"      1.000
line      10292      16102      "2 "      1 0
0
line_3      "Line MACHO_SPRNGS 345.0 to SPRNGR      345.0 Circuit 1"      1.000
line      11047      16104      "1 "      1 0
0
line_4      "Line HIDALGO      345.0 to GREENLEE      345.0 Circuit 1"      1.000
line      11080      16101      "1 "      1 0
0
line_5      "Line SOCORO_W      345.0 to SPRNGR      345.0 Circuit 1"      1.000
line      12250      16104      "1 "      1 0
0
line_6      "Line CHOLLA      500.0 to SAGUARO      500.0 Circuit 1"      1.000
line      14000      14004      "1 "      1 0
0
line_7      "Line CHOLLA      500.0 to SILVERKG      500.0 Circuit 1"      1.000
line      14000      15041      "1 "      1 0
0
line_8      "Line FOURCORN      500.0 to MOENKOPI      500.0 Circuit 1"      1.000
line      14001      14002      "1 "      1 0
0
line_9      "Line MOENKOPI      500.0 to CEDARMT      500.0 Circuit 1"      1.000
line      14002      14014      "1 "      1 0
0
line_10     "Line MOENKOPI      500.0 to ELDORDO      500.0 Circuit 1"      1.000
line      14002      24042      "1 "      1 0
0
line_11     "Line NAVAJO      500.0 to MOENKOPI      500.0 Circuit 1"      1.000
line      14003      14002      "1 "      1 0
0
line_12     "Line NAVAJO      500.0 to DUGAS      500.0 Circuit 1"      1.000
line      14003      14018      "1 "      1 0
0
line_13     "Line NAVAJO      500.0 to CRYSTAL      500.0 Circuit 1"      1.000
line      14003      26123      "1 "      1 0
0
line_14     "Line SAGUARO      500.0 to TORTOLIT      500.0 Circuit 1"      1.000
line      14004      16000      "1 "      1 0
0
line_15     "Line SAGUARO      500.0 to TORTOLIT      500.0 Circuit 2"      1.000
line      14004      16000      "2 "      1 0
0
line_16     "Line SAGUARO      500.0 to TORTLIT2      500.0 Circuit 1"      1.000
line      14004      16001      "1 "      1 0
0
line_17     "Line WESTWING      500.0 to MORGAN      500.0 Circuit 1"      1.000
line      14005      14011      "1 "      1 0
0
line_18     "Line YAVAPAI      500.0 to WESTWING      500.0 Circuit 1"      1.000
line      14006      14005      "1 "      1 0
0
line_19     "Line SNVLY      500.0 to MORGAN      500.0 Circuit 1"      1.000
line      14010      14011      "1 "      1 0
0
line_20     "Line MORGAN      500.0 to PNPKAPS      500.0 Circuit r1"      1.000
line      14011      14016      "r1"      1 0
0
line_21     "Line DELANEY      500.0 to SNVLY      500.0 Circuit 1"      1.000
line      14012      14010      "1 "      1 0
0
line_22     "Line CEDARMT      500.0 to YAVAPAI      500.0 Circuit 1"      1.000
line      14014      14006      "1 "      1 0
0
line_23     "Line SGRLF      500.0 to CHOLLA      500.0 Circuit 1"      1.000
line      14017      14000      "1 "      1 0
0
line_24     "Line DUGAS      500.0 to MORGAN      500.0 Circuit 1"      1.000
line      14018      14011      "1 "      1 0
0
line_25     "Line Q043B1      500.0 to HDWSH      500.0 Circuit 1"      1.000
line      14021      22342      "1 "      1 0
0
line_26     "Line CHOLLA      345.0 to PRECHCYN      345.0 Circuit 1"      1.000
line      14100      14103      "1 "      1 0
0
line_27     "Line CHOLLA      345.0 to MAZATZAL      345.0 Circuit 1"      1.000

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line	14100	14107	"1 "	1 0		
0						
line_28			"Line FOURCORN	345.0 to SAN_JUAN	345.0 Circuit 1"	1.000
line	14101	10292	"1 "	1 0		
0						
line_29			"Line FOURCORN	345.0 to WESTMESA	345.0 Circuit 1"	1.000
line	14101	10369	"1 "	1 0		
0						
line_30			"Line FOURCORN	345.0 to RIOPUERCO	345.0 Circuit 1"	1.000
line	14101	10390	"1 "	1 0		
0						
line_31			"Line FOURCORN	345.0 to CHOLLA	345.0 Circuit 1"	1.000
line	14101	14100	"1 "	1 0		
0						
line_32			"Line FOURCORN	345.0 to CHOLLA	345.0 Circuit 2"	1.000
line	14101	14100	"2 "	1 0		
0						
line_33			"Line PRECHCYN	345.0 to PNP KAPS	345.0 Circuit 1"	1.000
line	14103	14102	"1 "	1 0		
0						
line_34			"Line MAZATZAL	345.0 to PNP KAPS	345.0 Circuit 1"	1.000
line	14107	14102	"1 "	1 0		
0						
line_35			"Line OCOG TN	230.0 to OCOG TS	230.0 Circuit 1"	1.000
line	14198	14199	"1 "	1 0		
0						
line_36			"Line OCOG TN	230.0 to OCO S	230.0 Circuit 1"	1.000
line	14198	14640	"1 "	1 0		
0						
line_37			"Line OCOG TS	230.0 to OCO C	230.0 Circuit 1"	1.000
line	14199	14642	"1 "	1 0		
0						
line_38			"Line BUCKEYE	230.0 to LIBERTY	230.0 Circuit 1"	1.000
line	14201	19052	"1 "	1 0		
0						
line_39			"Line CACTUS	230.0 to PPAPS N	230.0 Circuit 1"	1.000
line	14202	14278	"1 "	1 0		
0						
line_40			"Line CASGRAPS	230.0 to DBG	230.0 Circuit 1"	1.000
line	14203	15235	"1 "	1 0		
0						
line_41			"Line CHOLLA	230.0 to LEUPP	230.0 Circuit 1"	1.000
line	14204	14215	"1 "	1 0		
0						
line_42			"Line COCONINO	230.0 to VERDE S	230.0 Circuit 1"	1.000
line	14205	14247	"1 "	1 0		
0						
line_43			"Line CTRYCLUB	230.0 to LINCSTR T	230.0 Circuit 1"	1.000
line	14206	14216	"1 "	1 0		
0						
line_44			"Line CTRYCLUB	230.0 to GRNDTRML	230.0 Circuit 1"	1.000
line	14206	14270	"1 "	1 0		
0						
line_45			"Line DEERVALY	230.0 to WESTWNGE	230.0 Circuit 1"	1.000
line	14207	14259	"1 "	1 0		
0						
line_46			"Line DEERVALY	230.0 to ALEXANDR	230.0 Circuit 1"	1.000
line	14207	15202	"1 "	1 0		
0						
line_47			"Line DEERVALY	230.0 to PINPKSRP	230.0 Circuit 1"	1.000
line	14207	15211	"1 "	1 0		
0						
line_48			"Line EL SOL	230.0 to AGUAFRIA	230.0 Circuit 1"	1.000
line	14210	15201	"1 "	1 0		
0						
line_49			"Line FOURCORN	230.0 to PILLAR	230.0 Circuit 1"	1.000
line	14211	10248	"1 "	1 0		
0						
line_50			"Line GLENDALE	230.0 to GRNDTRML	230.0 Circuit 1"	1.000
line	14212	14270	"1 "	1 0		
0						
line_51			"Line LEUPP	230.0 to COCONINO	230.0 Circuit 1"	1.000
line	14215	14205	"1 "	1 0		
0						
line_52			"Line LINCSTR T	230.0 to WPHXAPS N	230.0 Circuit 1"	1.000
line	14216	14239	"1 "	1 0		
0						
line_53			"Line LONEPEAK	230.0 to SUNYSLOP	230.0 Circuit 1"	1.000
line	14217	14227	"1 "	1 0		
0						
line_54			"Line LONEPEAK	230.0 to PPAPS E	230.0 Circuit 1"	1.000

line	14217	14261	"1 "	1 0		
0						
line_55		"Line MEADOWBK		230.0 to CTRYCLUB	230.0 Circuit 1"	1.000
line	14218	14206	"1 "	1 0		
0						
line_56		"Line MEADOWBK		230.0 to SUNYSLOP	230.0 Circuit 1"	1.000
line	14218	14227	"1 "	1 0		
0						
line_57		"Line REACH		230.0 to LONEPEAK	230.0 Circuit 1"	1.000
line	14220	14217	"1 "	1 0		
0						
line_58		"Line REACH		230.0 to PPAPS C	230.0 Circuit 1"	1.000
line	14220	14260	"1 "	1 0		
0						
line_59		"Line PPAPS W		230.0 to PPAPS C	230.0 Circuit 1"	1.000
line	14221	14260	"1 "	1 0		
0						
line_60		"Line PPAPS W		230.0 to PINPK	230.0 Circuit 1"	1.000
line	14221	19062	"1 "	1 0		
0						
line_61		"Line KOMATKE		230.0 to PANDA	230.0 Circuit 1"	1.000
line	14224	14238	"1 "	1 0		
0						
line_62		"Line SAGUARO		230.0 to TATMOMLI	230.0 Circuit 1"	1.000
line	14225	14229	"1 "	1 0		
0						
line_63		"Line SAGUARO		230.0 to MILLIGAN	230.0 Circuit 1"	1.000
line	14225	14271	"1 "	1 0		
0						
line_64		"Line SNTAROSA		230.0 to TATMOMLI	230.0 Circuit 1"	1.000
line	14226	14229	"1 "	1 0		
0						
line_65		"Line SNTAROSA		230.0 to DBG	230.0 Circuit 1"	1.000
line	14226	15235	"1 "	1 0		
0						
line_66		"Line SNTAROSA		230.0 to TESTTRAK	230.0 Circuit 1"	1.000
line	14226	19068	"1 "	1 0		
0						
line_67		"Line SURPRISE		230.0 to EL SOL	230.0 Circuit 1"	1.000
line	14228	14210	"1 "	1 0		
0						
line_68		"Line SURPRISE		230.0 to WESTWNGW	230.0 Circuit 1"	1.000
line	14228	14231	"1 "	1 0		
0						
line_69		"Line WESTWNGW		230.0 to EL SOL	230.0 Circuit 1"	1.000
line	14231	14210	"1 "	1 0		
0						
line_70		"Line WESTWNGW		230.0 to WESTWNGE	230.0 Circuit 1"	1.000
line	14231	14259	"1 "	1 0		
0						
line_71		"Line WESTWNGW		230.0 to PINPK	230.0 Circuit 1"	1.000
line	14231	19062	"1 "	1 0		
0						
line_72		"Line WHTNKAPS		230.0 to EL SOL	230.0 Circuit 1"	1.000
line	14232	14210	"1 "	1 0		
0						
line_73		"Line WHTNKAPS		230.0 to RUDD	230.0 Circuit 1"	1.000
line	14232	15230	"1 "	1 0		
0						
line_74		"Line WPHXAPSS		230.0 to WPHXAPSN	230.0 Circuit 1"	1.000
line	14233	14239	"1 "	1 0		
0						
line_75		"Line WPHXAPSS		230.0 to RUDD	230.0 Circuit 1"	1.000
line	14233	15230	"1 "	1 0		
0						
line_76		"Line YAVAPAI		230.0 to VERDE N	230.0 Circuit 1"	1.000
line	14234	14230	"1 "	1 0		
0						
line_77		"Line YAVAPAI		230.0 to WILOWLKE	230.0 Circuit 1"	1.000
line	14234	14249	"1 "	1 0		
0						
line_78		"Line KYR-WEST		230.0 to KNOX	230.0 Circuit 1"	1.000
line	14236	15219	"1 "	1 0		
0						
line_79		"Line PANDA		230.0 to GILABEND	230.0 Circuit 1"	1.000
line	14238	14235	"1 "	1 0		
0						
line_80		"Line WPHXAPSN		230.0 to WHTNKAPS	230.0 Circuit 1"	1.000
line	14239	14232	"1 "	1 0		
0						
line_81		"Line FORTROCK		230.0 to ROUNDVLY	230.0 Circuit 1"	1.000

line	14240	14223	"1 "	1 0		
0						
line_82		"Line FORTROCK		230.0 to JUNIPRMT	230.0 Circuit 1"	1.000
line	14240	14264	"1 "	1 0		
0						
line_83		"Line RACEWAY		230.0 to RACEWYWA	230.0 Circuit 1"	1.000
line	14246	19115	"1 "	1 0		
0						
line_84		"Line VERDE S		230.0 to VERDE N	230.0 Circuit 1"	1.000
line	14247	14230	"1 "	1 0		
0						
line_85		"Line GLENDALW		230.0 to GLENDALE	230.0 Circuit 1"	1.000
line	14248	14212	"1 "	1 0		
0						
line_86		"Line GLENDALW		230.0 to AGUAFRIA	230.0 Circuit 1"	1.000
line	14248	15201	"1 "	1 0		
0						
line_87		"Line WILOWLKE		230.0 to PRESCOTT	230.0 Circuit 1"	1.000
line	14249	14222	"1 "	1 0		
0						
line_88		"Line WILOWLKW		230.0 to WILOWLKE	230.0 Circuit 1"	1.000
line	14250	14249	"1 "	1 0		
0						
line_89		"Line WILOWLKW		230.0 to PRSCOTWA	230.0 Circuit 1"	1.000
line	14250	19106	"1 "	1 0		
0						
line_90		"Line AVERY		230.0 to RACEWAY	230.0 Circuit 1"	1.000
line	14253	14246	"1 "	1 0		
0						
line_91		"Line AVERY		230.0 to SCTWSH	230.0 Circuit 1"	1.000
line	14253	14257	"1 "	1 0		
0						
line_92		"Line TRLBY		230.0 to PLMVLY	230.0 Circuit 1"	1.000
line	14254	14252	"1 "	1 0		
0						
line_93		"Line SCTWSH		230.0 to PPAPS W	230.0 Circuit 1"	1.000
line	14257	14221	"1 "	1 0		
0						
line_94		"Line TS4		230.0 to KOMATKE	230.0 Circuit 1"	1.000
line	14258	14224	"1 "	1 0		
0						
line_95		"Line TS4		230.0 to PLMVLY	230.0 Circuit 1"	1.000
line	14258	14252	"1 "	1 0		
0						
line_96		"Line PPAPS C		230.0 to PPAPS E	230.0 Circuit 1"	1.000
line	14260	14261	"1 "	1 0		
0						
line_97		"Line SOLANA		230.0 to PANDA	230.0 Circuit 1"	1.000
line	14263	14238	"1 "	1 0		
0						
line_98		"Line JUNIPRMT		230.0 to SELIGMAN	230.0 Circuit 1"	1.000
line	14264	14244	"1 "	1 0		
0						
line_99		"Line SNVLY		230.0 to TRLBY	230.0 Circuit 1"	1.000
line	14265	14254	"1 "	1 0		
0						
line_100		"Line N.GILA		230.0 to ORCHRD	230.0 Circuit 1"	1.000
line	14267	14262	"1 "	1 0		
0						
line_101		"Line MILLIGAN		230.0 to CASGRAPS	230.0 Circuit 1"	1.000
line	14271	14203	"1 "	1 0		
0						
line_102		"Line MORGAN		230.0 to RACEWAY	230.0 Circuit 1"	1.000
line	14272	14246	"1 "	1 0		
0						
line_103		"Line PPAPS N		230.0 to PPAPS E	230.0 Circuit 1"	1.000
line	14278	14261	"1 "	1 0		
0						
line_104		"Line PPAPS N		230.0 to PINPKSRP	230.0 Circuit 1"	1.000
line	14278	15211	"1 "	1 0		
0						
line_105		"Line PPAPS N		230.0 to PINPKSRP	230.0 Circuit 2"	1.000
line	14278	15211	"2 "	1 0		
0						
line_106		"Line CORONADO		500.0 to SGRLF	500.0 Circuit 1"	1.000
line	15001	14017	"1 "	1 0		
0						
line_107		"Line CORONADO		500.0 to SILVERKG	500.0 Circuit 1"	1.000
line	15001	15041	"1 "	1 0		
0						
line_108		"Line PALOVRDE		500.0 to WESTWING	500.0 Circuit 1"	1.000

line	15021	14005	"1 "	1 0			
0							
line_109		"Line PALOVRDE		500.0 to WESTWING	500.0 Circuit 2"	1.000	
line	15021	14005	"2 "	1 0			
0							
line_110		"Line PALOVRDE		500.0 to DELANEY	500.0 Circuit 1"	1.000	
line	15021	14012	"1 "	1 0			
0							
line_111		"Line PALOVRDE		500.0 to RUDD	500.0 Circuit 1"	1.000	
line	15021	15061	"1 "	1 0			
0							
line_112		"Line PALOVRDE		500.0 to COLRIVER	500.0 Circuit 1"	1.000	
line	15021	24900	"1 "	1 0			
0							
line_113		"Line PERKINPS		500.0 to WESTWING	500.0 Circuit 1"	1.000	
line	15033	14005	"1 "	1 0			
0							
line_114		"Line PERKINPS		500.0 to PERKINS	500.0 Circuit 1"	1.000	
line	15033	15034	"1 "	1 0			
0							
line_115		"Line SILVERKG		500.0 to SAGUARO	500.0 Circuit 1"	1.000	
line	15041	14004	"1 "	1 0			
0							
line_116		"Line SILVERKG		500.0 to BROWNING	500.0 Circuit 1"	1.000	
line	15041	15051	"1 "	1 0			
0							
line_117		"Line BROWNING		500.0 to KYRENE	500.0 Circuit 1"	1.000	
line	15051	15011	"1 "	1 0			
0							
line_118		"Line PINAL_C		500.0 to BROWNING	500.0 Circuit 1"	1.000	
line	15080	15051	"1 "	1 0			
0							
line_119		"Line PINAL_C		500.0 to TORTOLIT	500.0 Circuit 1"	1.000	
line	15080	16000	"1 "	1 0			
0							
line_120		"Line DUKE		500.0 to PINAL_C	500.0 Circuit 1"	1.000	
line	15087	15080	"1 "	1 0			
0							
line_121		"Line DUKE		500.0 to PINAL_W	500.0 Circuit 1"	1.000	
line	15087	15088	"1 "	1 0			
0							
line_122		"Line JOJOBA		500.0 to GILARIVR	500.0 Circuit 1"	1.000	
line	15089	14007	"1 "	1 0			
0							
line_123		"Line JOJOBA		500.0 to GILARIVR	500.0 Circuit 2"	1.000	
line	15089	14007	"2 "	1 0			
0							
line_124		"Line JOJOBA		500.0 to KYRENE	500.0 Circuit 1"	1.000	
line	15089	15011	"1 "	1 0			
0							
line_125		"Line HASSYAMP		500.0 to PALOVRDE	500.0 Circuit 1"	1.000	
line	15090	15021	"1 "	1 0			
0							
line_126		"Line HASSYAMP		500.0 to PALOVRDE	500.0 Circuit 2"	1.000	
line	15090	15021	"2 "	1 0			
0							
line_127		"Line HASSYAMP		500.0 to PALOVRDE	500.0 Circuit 3"	1.000	
line	15090	15021	"3 "	1 0			
0							
line_128		"Line HASSYAMP		500.0 to PINAL_W	500.0 Circuit 1"	1.000	
line	15090	15088	"1 "	1 0			
0							
line_129		"Line HASSYAMP		500.0 to JOJOBA	500.0 Circuit 1"	1.000	
line	15090	15089	"1 "	1 0			
0							
line_130		"Line HASSYAMP		500.0 to ARLINTON	500.0 Circuit 1"	1.000	
line	15090	15092	"1 "	1 0			
0							
line_131		"Line HASSYAMP		500.0 to HARQUAHA	500.0 Circuit 1"	1.000	
line	15090	15093	"1 "	1 0			
0							
line_132		"Line HASSYAMP		500.0 to HDWSH	500.0 Circuit 1"	1.000	
line	15090	22342	"1 "	1 0			
0							
line_133		"Line HASSYAMP		500.0 to N.GILA	500.0 Circuit 1"	1.000	
line	15090	22536	"1 "	1 0			
0							
line_134		"Line MESQUITE		230.0 to C643T	230.0 Circuit 1"	1.000	
line	15163	15035	"1 "	1 0			
0							
line_135		"Line MESQUITE		230.0 to C643T	230.0 Circuit 2"	1.000	

line	15163	15035	"2 "	1 0		
0						
line_136		"Line AGUAFRIA	230.0	to WESTWNGW	230.0 Circuit 1"	1.000
line	15201	14231	"1 "	1 0		
0						
line_137		"Line AGUAFRIA	230.0	to WESTWNGW	230.0 Circuit 2"	1.000
line	15201	14231	"2 "	1 0		
0						
line_138		"Line AGUAFRIA	230.0	to ALEXANDR	230.0 Circuit 1"	1.000
line	15201	15202	"1 "	1 0		
0						
line_139		"Line AGUAFRIA	230.0	to WHITETNK	230.0 Circuit 1"	1.000
line	15201	15218	"1 "	1 0		
0						
line_140		"Line ANDERSON	230.0	to KYR-WEST	230.0 Circuit 1"	1.000
line	15203	14236	"1 "	1 0		
0						
line_141		"Line BRANDOW	230.0	to KYR-EAST	230.0 Circuit 1"	1.000
line	15204	15207	"1 "	1 0		
0						
line_142		"Line BRANDOW	230.0	to PAPAGOBT	230.0 Circuit 1"	1.000
line	15204	15209	"1 "	1 0		
0						
line_143		"Line BRANDOW	230.0	to WARD	230.0 Circuit 2"	1.000
line	15204	15217	"2 "	1 0		
0						
line_144		"Line BRANDOW	230.0	to WARD	230.0 Circuit 4"	1.000
line	15204	15217	"4 "	1 0		
0						
line_145		"Line CORBELL	230.0	to KYR-EAST	230.0 Circuit 1"	1.000
line	15205	15207	"1 "	1 0		
0						
line_146		"Line KYR-EAST	230.0	to SCHRADER	230.0 Circuit 1"	1.000
line	15207	15214	"1 "	1 0		
0						
line_147		"Line ORME	230.0	to ANDERSON	230.0 Circuit 1"	1.000
line	15208	15203	"1 "	1 0		
0						
line_148		"Line ORME	230.0	to ANDERSON	230.0 Circuit 2"	1.000
line	15208	15203	"2 "	1 0		
0						
line_149		"Line ORME	230.0	to RUDD	230.0 Circuit 1"	1.000
line	15208	15230	"1 "	1 0		
0						
line_150		"Line ORME	230.0	to RUDD	230.0 Circuit 2"	1.000
line	15208	15230	"2 "	1 0		
0						
line_151		"Line PAPAGOBT	230.0	to KYR-WEST	230.0 Circuit 1"	1.000
line	15209	14236	"1 "	1 0		
0						
line_152		"Line PAPAGOBT	230.0	to PINPKSRP	230.0 Circuit 1"	1.000
line	15209	15211	"1 "	1 0		
0						
line_153		"Line PINPKSRP	230.0	to BRANDOW	230.0 Circuit 1"	1.000
line	15211	15204	"1 "	1 0		
0						
line_154		"Line PINPKSRP	230.0	to BRANDOW	230.0 Circuit 2"	1.000
line	15211	15204	"2 "	1 0		
0						
line_155		"Line ROGERS	230.0	to THUNDRST	230.0 Circuit 1"	1.000
line	15212	15216	"1 "	1 0		
0						
line_156		"Line ROGERS	230.0	to ROGSWAPA	230.0 Circuit 1"	1.000
line	15212	19502	"1 "	1 0		
0						
line_157		"Line ROGERS	230.0	to ROGSWAPA	230.0 Circuit 2"	1.000
line	15212	19502	"2 "	1 0		
0						
line_158		"Line SANTAN	230.0	to CORBELL	230.0 Circuit 1"	1.000
line	15213	15205	"1 "	1 0		
0						
line_159		"Line SANTAN	230.0	to ROGERS	230.0 Circuit 1"	1.000
line	15213	15212	"1 "	1 0		
0						
line_160		"Line SANTAN	230.0	to THUNDRST	230.0 Circuit 1"	1.000
line	15213	15216	"1 "	1 0		
0						
line_161		"Line SCHRADER	230.0	to SANTAN	230.0 Circuit 1"	1.000
line	15214	15213	"1 "	1 0		
0						
line_162		"Line SCHRADER	230.0	to RS-28	230.0 Circuit 1"	1.000

line	15214	15228	"1 "	1 0		
0						
line_163		"Line SILVERKG		230.0 to GOLDFELD	230.0 Circuit 1"	1.000
line	15215	15206	"1 "	1 0		
0						
line_164		"Line SILVERKG		230.0 to RS-29	230.0 Circuit 1"	1.000
line	15215	15260	"1 "	1 0		
0						
line_165		"Line SILVERKG		230.0 to RS-29	230.0 Circuit 2"	1.000
line	15215	15260	"2 "	1 0		
0						
line_166		"Line THUNDRST		230.0 to GOLDFELD	230.0 Circuit 1"	1.000
line	15216	15206	"1 "	1 0		
0						
line_167		"Line THUNDRST		230.0 to GOLDFELD	230.0 Circuit 2"	1.000
line	15216	15206	"2 "	1 0		
0						
line_168		"Line KNOX		230.0 to SNTAROSA	230.0 Circuit 1"	1.000
line	15219	14226	"1 "	1 0		
0						
line_169		"Line BROWNING		230.0 to CORBELL	230.0 Circuit 1"	1.000
line	15222	15205	"1 "	1 0		
0						
line_170		"Line BROWNING		230.0 to SANTAN	230.0 Circuit 1"	1.000
line	15222	15213	"1 "	1 0		
0						
line_171		"Line DINOSAUR		230.0 to BROWNING	230.0 Circuit 1"	1.000
line	15223	15222	"1 "	1 0		
0						
line_172		"Line ABEL		230.0 to SCHRADER	230.0 Circuit 1"	1.000
line	15224	15214	"1 "	1 0		
0						
line_173		"Line ABEL		230.0 to DINOSAUR	230.0 Circuit 1"	1.000
line	15224	15223	"1 "	1 0		
0						
line_174		"Line ABEL		230.0 to PFISTER	230.0 Circuit 1"	1.000
line	15224	15225	"1 "	1 0		
0						
line_175		"Line ABEL		230.0 to RANDOLPH	230.0 Circuit 1"	1.000
line	15224	15240	"1 "	1 0		
0						
line_176		"Line PFISTER		230.0 to SANTAN	230.0 Circuit 1"	1.000
line	15225	15213	"1 "	1 0		
0						
line_177		"Line RUDD		230.0 to PLMVLY	230.0 Circuit 1"	1.000
line	15230	14252	"1 "	1 0		
0						
line_178		"Line RUDD		230.0 to WHITETNK	230.0 Circuit 1"	1.000
line	15230	15218	"1 "	1 0		
0						
line_179		"Line PINAL_C		230.0 to DBG	230.0 Circuit 1"	1.000
line	15231	15235	"1 "	1 0		
0						
line_180		"Line PINAL_C		230.0 to RANDOLPH	230.0 Circuit 1"	1.000
line	15231	15240	"1 "	1 0		
0						
line_181		"Line GREENLEE		345.0 to WINCHSTR	345.0 Circuit 1"	1.000
line	16101	16109	"1 "	1 0		
0						
line_182		"Line GREENLEE		345.0 to WILLOW	345.0 Circuit 1"	1.000
line	16101	16112	"1 "	1 0		
0						
line_183		"Line GREENLEE		345.0 to COPPERVR	345.0 Circuit 1"	1.000
line	16101	16900	"1 "	1 0		
0						
line_184		"Line MCKINLEY		345.0 to SPRINGR	345.0 Circuit 1"	1.000
line	16102	16104	"1 "	1 0		
0						
line_185		"Line MCKINLEY		345.0 to SPRINGR	345.0 Circuit 2"	1.000
line	16102	16104	"2 "	1 0		
0						
line_186		"Line SPRINGR		345.0 to CORONADO	345.0 Circuit 1"	1.000
line	16104	16100	"1 "	1 0		
0						
line_187		"Line SPRINGR		345.0 to GREENLEE	345.0 Circuit 1"	1.000
line	16104	16101	"1 "	1 0		
0						
line_188		"Line SPRINGR		345.0 to VAIL2	345.0 Circuit 1"	1.000
line	16104	16106	"1 "	1 0		
0						
line_189		"Line VAIL		345.0 to SOUTH	345.0 Circuit 1"	1.000

line	16105	16103	"1 "	1 0		
0						
line_190		"Line WESTWING		345.0 to PINALWES	345.0 Circuit 1"	1.000
line	16107	16114	"1 "	1 0		
0						
line_191		"Line WINCHSTR		345.0 to VAIL	345.0 Circuit 1"	1.000
line	16109	16105	"1 "	1 0		
0						
line_192		"Line WINCHSTR		345.0 to WILLOW	345.0 Circuit 1"	1.000
line	16109	16112	"1 "	1 0		
0						
line_193		"Line WILLOW		345.0 to BOWIE	345.0 Circuit 1"	1.000
line	16112	16111	"1 "	1 0		
0						
line_194		"Line WILLOW		345.0 to BOWIE	345.0 Circuit 2"	1.000
line	16112	16111	"2 "	1 0		
0						
line_195		"Line PINALWES		345.0 to SOUTH	345.0 Circuit 1"	1.000
line	16114	16103	"1 "	1 0		
0						
line_196		"Line TORTOLIT		345.0 to NLOOP345	345.0 Circuit 1"	1.000
line	16115	16124	"1 "	1 0		
0						
line_197		"Line COPPERVR		230.0 to FRISCO	230.0 Circuit 1"	1.000
line	16901	16902	"1 "	1 0		
0						
line_198		"Line PD-MORNC		230.0 to FRISCO	230.0 Circuit 1"	1.000
line	16903	16902	"1 "	1 0		
0						
line_199		"Line APACHE		230.0 to BUTERFLD	230.0 Circuit 1"	1.000
line	17002	17007	"1 "	1 0		
0						
line_200		"Line APACHE		230.0 to REDTAIL	230.0 Circuit 1"	1.000
line	17002	17018	"1 "	1 0		
0						
line_201		"Line APACHE		230.0 to WINCHSTR	230.0 Circuit 1"	1.000
line	17002	17105	"1 "	1 0		
0						
line_202		"Line BICKNELL		345.0 to VAIL	345.0 Circuit 1"	1.000
line	17005	16105	"1 "	1 0		
0						
line_203		"Line BUTERFLD		230.0 to PANTANO	230.0 Circuit 1"	1.000
line	17007	17016	"1 "	1 0		
0						
line_204		"Line BUTERFLD		230.0 to SAN RAF	230.0 Circuit 1"	1.000
line	17007	17020	"1 "	1 0		
0						
line_205		"Line DOSCONDO		230.0 to HACKBERY	230.0 Circuit 1"	1.000
line	17008	17044	"1 "	1 0		
0						
line_206		"Line MORENCI		230.0 to PD-MORNC	230.0 Circuit 1"	1.000
line	17014	16903	"1 "	1 0		
0						
line_207		"Line MORENCI		230.0 to GREEN-SW	230.0 Circuit 1"	1.000
line	17014	17009	"1 "	1 0		
line 16903 17014		"1 " 1 1				
0						
line_208		"Line PANTANO		230.0 to NEWTUCSN	230.0 Circuit 1"	1.000
line	17016	17676	"1 "	1 0		
0						
line_209		"Line REDTAIL		230.0 to DOSCONDO	230.0 Circuit 1"	1.000
line	17018	17008	"1 "	1 0		
0						
line_210		"Line HACKBERY		230.0 to MORENCI	230.0 Circuit 1"	1.000
line	17044	17014	"1 "	1 0		
0						
line_211		"Line SAHUARIT		230.0 to BICKNELL	230.0 Circuit 1"	1.000
line	17102	17004	"1 "	1 0		
0						
line_212		"Line NEWTUCSN		230.0 to SAHUARIT	230.0 Circuit 1"	1.000
line	17676	17102	"1 "	1 0		
0						
line_213		"Line HENDRSON		230.0 to MEAD N	230.0 Circuit 1"	1.000
line	18006	19011	"1 "	1 0		
0						
line_214		"Line BC TAP		230.0 to MEAD N	230.0 Circuit 1"	1.000
line	18055	19011	"1 "	1 0		
0						
line_215		"Line H ALLEN		500.0 to MEAD	500.0 Circuit 1"	1.000
line	18450	19038	"1 "	1 0		
0						

line_216		"Line MEAD N	230.0 to ARDEN	230.0 Circuit 1"	1.000
line	19011	18004 "1 "	1 0		
0					
line_217		"Line MEAD N	230.0 to EQUEST	230.0 Circuit 2"	1.000
line	19011	18600 "2 "	1 0		
0					
line_218		"Line MEAD N	230.0 to SINATRA	230.0 Circuit 1"	1.000
line	19011	18618 "1 "	1 0		
0					
line_219		"Line MEAD N	230.0 to HVRA3A4	230.0 Circuit 1"	1.000
line	19011	19043 "1 "	1 0		
0					
line_220		"Line MEAD N	230.0 to NEWPORT	230.0 Circuit 1"	1.000
line	19011	19321 "1 "	1 0		
0					
line_221		"Line MEAD N	230.0 to EASTSIDE	230.0 Circuit 1"	1.000
line	19011	19341 "1 "	1 0		
0					
line_222		"Line MEAD S	230.0 to EQUEST	230.0 Circuit 1"	1.000
line	19012	18600 "1 "	1 0		
0					
line_223		"Line MEAD S	230.0 to GREENWAY	230.0 Circuit 1"	1.000
line	19012	18674 "1 "	1 0		
0					
line_224		"Line MEAD S	230.0 to MEAD N	230.0 Circuit 1"	1.000
line	19012	19011 "1 "	1 0		
0					
line_225		"Line MEAD S	230.0 to ELDORDO	230.0 Circuit 1"	1.000
line	19012	24041 "1 "	1 0		
0					
line_226		"Line MEAD S	230.0 to ELDORDO	230.0 Circuit 2"	1.000
line	19012	24041 "2 "	1 0		
0					
line_227		"Line MEAD S	230.0 to MCCULLGH	230.0 Circuit 1"	1.000
line	19012	26046 "1 "	1 0		
0					
line_228		"Line MEAD S	230.0 to MCCULLGH	230.0 Circuit 2"	1.000
line	19012	26046 "2 "	1 0		
0					
line_229		"Line DAVIS	230.0 to RIVIERA	230.0 Circuit 1"	1.000
line	19022	17087 "1 "	1 0		
0					
line_230		"Line DAVIS	230.0 to MEAD N	230.0 Circuit 1"	1.000
line	19022	19011 "1 "	1 0		
0					
line_231		"Line DAVIS	230.0 to LONGTIN	230.0 Circuit 1"	1.000
line	19022	19224 "1 "	1 0		
0					
line_232		"Line DAVIS	230.0 to TOPOCK	230.0 Circuit 2"	1.000
line	19022	19320 "2 "	1 0		
0					
line_233		"Line DAVIS	230.0 to MCCULLGH	230.0 Circuit 1"	1.000
line	19022	26046 "1 "	1 0		
0					
line_234		"Line HOVRA5A6	230.0 to MEAD S	230.0 Circuit 1"	1.000
line	19029	19012 "1 "	1 0		
0					
line_235		"Line HOVRA7-9	230.0 to MEAD S	230.0 Circuit 1"	1.000
line	19030	19012 "1 "	1 0		
0					
line_236		"Line MEAD	500.0 to PERKINS	500.0 Circuit 1"	1.000
line	19038	15034 "1 "	1 0		
0					
line_237		"Line MEAD	500.0 to MARKETPL	500.0 Circuit 1"	1.000
line	19038	26044 "1 "	1 0		
0					
line_238		"Line PARKER	230.0 to EAGLEYE	230.0 Circuit 1"	1.000
line	19042	14209 "1 "	1 0		
0					
line_239		"Line PARKER	230.0 to BLK MESA	230.0 Circuit 1"	1.000
line	19042	19019 "1 "	1 0		
0					
line_240		"Line PARKER	230.0 to HAVASU	230.0 Circuit 1"	1.000
line	19042	19075 "1 "	1 0		
0					
line_241		"Line PARKER	230.0 to HARCUIVAR	230.0 Circuit 1"	1.000
line	19042	19204 "1 "	1 0		
0					
line_242		"Line PARKER	230.0 to GENE	230.0 Circuit 1"	1.000
line	19042	25402 "1 "	1 0		
0					

line_243		"Line COOLIDGE	230.0 to SUN ARIZ	230.0 Circuit 1"	1.000
0					
line_244	19045	19410 "1 "	1 0	230.0 Circuit 2"	1.000
0					
line_245	19045	"Line COOLIDGE	230.0 to SUN ARIZ	230.0 Circuit 1"	1.000
0					
line_246	19052	14231 "1 "	1 0	230.0 Circuit 1"	1.000
0					
line_247	19052	"Line LIBERTY	230.0 to ORME	230.0 Circuit 1"	1.000
0					
line_248	19052	15208 "1 "	1 0	230.0 Circuit 2"	1.000
0					
line_249	19052	"Line LIBERTY	230.0 to RUDD	230.0 Circuit 1"	1.000
0					
line_250	19052	15230 "2 "	1 0	230.0 Circuit 1"	1.000
0					
line_251	19052	"Line LIBERTY	230.0 to LIBTYPHS	230.0 Circuit 1"	1.000
0					
line_252	19052	19054 "1 "	1 0	230.0 Circuit 1"	1.000
0					
line_253	19052	"Line LIBERTY	230.0 to LONE BUT	230.0 Circuit 1"	1.000
0					
line_254	19052	19055 "1 "	1 0	230.0 Circuit 1"	1.000
0					
line_255	19052	"Line LIBERTY	230.0 to PHXWAPA	230.0 Circuit 1"	1.000
0					
line_256	19053	19061 "1 "	1 0	345.0 Circuit 1"	1.000
0					
line_257	19053	"Line LIBERTY	345.0 to PEACOCK	230.0 Circuit 1"	1.000
0					
line_258	19055	19315 "1 "	1 0	230.0 Circuit 1"	1.000
0					
line_259	19055	"Line LONE BUT	230.0 to TESTTRAK	230.0 Circuit 1"	1.000
0					
line_260	19055	19068 "1 "	1 0	230.0 Circuit 1"	1.000
0					
line_261	19055	"Line LONE BUT	230.0 to SUN ARIZ	230.0 Circuit 1"	1.000
0					
line_262	19056	19410 "1 "	1 0	230.0 Circuit 1"	1.000
0					
line_263	19056	"Line MCCONICO	230.0 to DAVIS	230.0 Circuit 1"	1.000
0					
line_264	19056	19022 "1 "	1 0	230.0 Circuit 1"	1.000
0					
line_265	19056	"Line MCCONICO	230.0 to GRIFFITH	230.0 Circuit 1"	1.000
0					
line_266	19056	19310 "1 "	1 0	230.0 Circuit 1"	1.000
0					
line_267	19056	"Line MCCONICO	230.0 to HARRIS	230.0 Circuit 1"	1.000
0					
line_268	19061	19651 "1 "	1 0	230.0 Circuit 1"	1.000
0					
line_269	19061	"Line PHXWAPA	230.0 to LONE BUT	230.0 Circuit 1"	1.000
0					
line_270	19062	19055 "1 "	1 0	230.0 Circuit 1"	1.000
0					
line_271	19062	"Line PINPK	230.0 to PINPKSRP	230.0 Circuit 1"	1.000
0					
line_272	19062	15211 "1 "	1 0	230.0 Circuit 2"	1.000
0					
line_273	19062	"Line PINPK	230.0 to PINPKSRP	230.0 Circuit 1"	1.000
0					
line_274	19062	15211 "2 "	1 0	230.0 Circuit 1"	1.000
0					
line_275	19068	"Line TESTTRAK	230.0 to ED5-230	230.0 Circuit 1"	1.000
0					
line_276	19068	19169 "1 "	1 0	230.0 Circuit 1"	1.000
0					
line_277	19068	"Line TESTTRAK	230.0 to CASAGRND	230.0 Circuit 1"	1.000
0					
line_278	19068	19218 "1 "	1 0	230.0 Circuit 1"	1.000
0					
line_279	19072	"Line HILLTOP	230.0 to MCCONICO	230.0 Circuit 1"	1.000
0					
line_280	19072	19056 "1 "	1 0	230.0 Circuit 1"	1.000
0					
line_281	19074	"Line N.HAVASU	230.0 to PARKER	230.0 Circuit 1"	1.000
0					
line_282	19074	19042 "1 "	1 0	230.0 Circuit 1"	1.000
0					
line_283	19074	"Line N.HAVASU	230.0 to TOPOCK	230.0 Circuit 1"	1.000
0					
line_284	19074	19320 "1 "	1 0	230.0 Circuit 1"	1.000
0					
line_285	19079	"Line HOVRN7N8	230.0 to MEAD S	230.0 Circuit 1"	1.000
0					
line_286	19079	19012 "1 "	1 0	230.0 Circuit 1"	1.000
0					
line_287	19080	"Line HOVRN5N6	230.0 to MEAD S	230.0 Circuit 1"	1.000
0					
line_288	19080	19012 "1 "	1 0	230.0 Circuit 1"	1.000
0					
line_289	19081	"Line HOVRN3N4	230.0 to MEAD S	230.0 Circuit 1"	1.000
0					
line_290	19081	19012 "1 "	1 0	230.0 Circuit 1"	1.000
0					
line_291	19082	"Line HOVRN1N2	230.0 to MEAD S	230.0 Circuit 1"	1.000
0					
line_292	19082	19012 "1 "	1 0	230.0 Circuit 1"	1.000
0					
line_293	19083	"Line HOVR1A2	230.0 to MEAD S	230.0 Circuit 1"	1.000
0					
line_294	19083	19012 "1 "	1 0		

line_270	19106	"Line PRSCOTWA 14222 "1 "	230.0 to PRESCOTT	230.0 Circuit 1"	1.000
line_271	19106	"Line PRSCOTWA 19501 "1 "	230.0 to RNDVLYTP	230.0 Circuit 1"	1.000
line_272	19107	"Line GAVLINWA 14243 "1 "	230.0 to GAVILNPK	230.0 Circuit 1"	1.000
line_273	19107	"Line GAVLINWA 19062 "1 "	230.0 to PINPK	230.0 Circuit 1"	1.000
line_274	19107	"Line GAVLINWA 19106 "1 "	230.0 to PRSCOTWA	230.0 Circuit 1"	1.000
line_275	19115	"Line RACEWYWA 14259 "1 "	230.0 to WESTWNGE	230.0 Circuit 1"	1.000
line_276	19204	"Line HARCUIVAR 17172 "1 "	230.0 to HARCUI AZ	230.0 Circuit 1"	1.000
line_277	19204	"Line HARCUIVAR 19500 "1 "	230.0 to HASSYTAP	230.0 Circuit 1"	1.000
line_278	19208	"Line N.WADDEL 19115 "1 "	230.0 to RACEWYWA	230.0 Circuit 1"	1.000
line_279	19215	"Line SPKHILTP 19045 "1 "	230.0 to COOLIDGE	230.0 Circuit 1"	1.000
line_280	19224	"Line LONGTIN 19320 "1 "	230.0 to TOPOCK	230.0 Circuit 1"	1.000
line_281	19310	"Line GRIFFITH 19314 "1 "	230.0 to PEACOCK	230.0 Circuit 1"	1.000
line_282	19314	"Line PEACOCK 19072 "1 "	230.0 to HILLTOP	230.0 Circuit 1"	1.000
line_283	19315	"Line PEACOCK 19037 "1 "	345.0 to MEAD	345.0 Circuit 1"	1.000
line_284	19320	"Line TOPOCK 19019 "1 "	230.0 to BLK MESA	230.0 Circuit 1"	1.000
line_285	19320	"Line TOPOCK 19316 "1 "	230.0 to SOPOINT	230.0 Circuit 1"	1.000
line_286	19320	"Line TOPOCK 19316 "2 "	230.0 to SOPOINT	230.0 Circuit 2"	1.000
line_287	19321	"Line NEWPORT 19341 "1 "	230.0 to EASTSIDE	230.0 Circuit 1"	1.000
line_288	19410	"Line SUN ARIZ 15231 "1 "	230.0 to PINAL_C	230.0 Circuit 1"	1.000
line_289	19500	"Line HASSYTAP 17173 "1 "	230.0 to HASSY AZ	230.0 Circuit 1"	1.000
line_290	19500	"Line HASSYTAP 19052 "1 "	230.0 to LIBERTY	230.0 Circuit 1"	1.000
line_291	19501	"Line RNDVLYTP 14223 "1 "	230.0 to ROUNDVLY	230.0 Circuit 1"	1.000
line_292	19501	"Line RNDVLYTP 19314 "1 "	230.0 to PEACOCK	230.0 Circuit 1"	1.000
line_293	19502	"Line ROGSWAPA 19062 "1 "	230.0 to PINPK	230.0 Circuit 1"	1.000
line_294	19502	"Line ROGSWAPA 19062 "2 "	230.0 to PINPK	230.0 Circuit 2"	1.000
line_295	19502	"Line ROGSWAPA 19215 "1 "	230.0 to SPKHILTP	230.0 Circuit 1"	1.000
line_296	24019	"Line CAMINO 19012 "E "	230.0 to MEAD S	230.0 Circuit E"	1.000

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line_297		"Line CAMINO	230.0 to MEAD S	230.0 Circuit W"	1.000
line	24019	19012 "W "	1 0		
0					
line_298		"Line PINTO PS	345.0 to FOURCORN	345.0 Circuit 1"	1.000
line	66235	14101 "1 "	1 0		
0					
line_299		"Line SIGURDPS	230.0 to GLENCANY	230.0 Circuit 1"	1.000
line	66355	79031 "1 "	1 0		
0					
line_300		"Line BLKGLADE	230.0 to SHIPROCK	230.0 Circuit 1"	1.000
line	72770	79063 "1 "	1 0		
0					
line_301		"Line FLAGSTAF	345.0 to GLENCANY	345.0 Circuit 1"	1.000
line	79024	79032 "1 "	1 0		
0					
line_302		"Line FLAGSTAF	345.0 to GLENCANY	345.0 Circuit 2"	1.000
line	79024	79032 "2 "	1 0		
0					
line_303		"Line FLAGSTAF	345.0 to PINPKBRB	345.0 Circuit 1"	1.000
line	79024	79053 "1 "	1 0		
0					
line_304		"Line FLAGSTAF	345.0 to PINPKBRB	345.0 Circuit 2"	1.000
line	79024	79053 "2 "	1 0		
0					
line_305		"Line GLEN PS	230.0 to NAVAJO	230.0 Circuit 1"	1.000
line	79028	79093 "1 "	1 0		
0					
line_306		"Line KAYENTA	230.0 to SHIPROCK	230.0 Circuit 1"	1.000
line	79043	79063 "1 "	1 0		
0					
line_307		"Line KAYENTA	230.0 to LNGHOUSE	230.0 Circuit 1"	1.000
line	79043	79096 "1 "	1 0		
0					
line_308		"Line SHIPROCK	345.0 to SAN_JUAN	345.0 Circuit 1"	1.000
line	79064	10292 "1 "	1 0		
0					
line_309		"Line SHIPROCK	345.0 to FOURCORN	345.0 Circuit 1"	1.000
line	79064	14101 "1 "	1 0		
0					
line_310		"Line NAVAJO	230.0 to LNGHOUSE	230.0 Circuit 1"	1.000
line	79093	79096 "1 "	1 0		
0					
line_311		"Line PAHRUMP	230.0 to MEAD S	230.0 Circuit 1"	1.000
line	189012	19012 "1 "	1 0		
0					
line_312		"Line BUCKEYE	230.0 to BUCKEYE2	230.0 Circuit 1"	1.000
line	14201	14213 "1 "	1 0		
0					
line_313		"Line EAGLEYE	230.0 to BUCKEYE2	230.0 Circuit 1"	1.000
line	14209	14213 "1 "	1 0		
0					
line_314		"Line BUCKEYE2	230.0 to LIBERTY	230.0 Circuit 1"	1.000
line	14213	19052 "1 "	1 0		
0					
line_315		"Line CACTUS	230.0 to OCO N	230.0 Circuit 1"	1.000
line	14202	14641 "1 "	1 0		
0					
line_316		"Line LINCSTRT	230.0 to OCO N	230.0 Circuit 1"	1.000
line	14216	14641 "1 "	1 0		
0					
line_317		"Line KYR-WEST	230.0 to OCO C	230.0 Circuit 1"	1.000
line	14236	14642 "1 "	1 0		
0					
line_318		"Line PPAPS N	230.0 to OCO S	230.0 Circuit 1"	1.000
line	14278	14640 "1 "	1 0		
0					
line_319		"Line OCO S	230.0 to OCO C	230.0 Circuit 1"	1.000
line	14640	14642 "1 "	1 0		
0					
line_320		"Line OCO C	230.0 to OCO N	230.0 Circuit 1"	1.000
line	14642	14641 "1 "	1 0		
0					
tran_321		"Tran CHOLLA	500.00 to CHOLLA	345.00 Circuit 1CHOLLA3T	34.50"
1.000					
tran	14000	14100 "1 "	0 85901		
0					
tran_322		"Tran CHOLLA	500.00 to CHOLLA	345.00 Circuit 2CHOLLA6T	34.50"
1.000					
tran	14000	14100 "2 "	0 85902		
0					
tran_323		"Tran FOURCORN	500.00 to FOURCORN	345.00 Circuit 14C 1AA T	13.80"

1.000	tran	14001	14101	"1 "	0	85903			
0									
tran_324				"Tran WESTWING		500.00 to WESTWNGW	230.00 Circuit 2WESTWG 4	34.50"	
1.000	tran	14005	14231	"2 "	0	14409			
0									
tran_325				"Tran WESTWING		500.00 to WESTWNGW	230.00 Circuit 3WESTWG10	34.50"	
1.000	tran	14005	14231	"3 "	0	14410			
0									
tran_326				"Tran WESTWING		500.00 to WESTWNGE	230.00 Circuit 1WESTWG 1	34.50"	
1.000	tran	14005	14259	"1 "	0	14408			
0									
tran_327				"Tran WESTWING		500.00 to WESTWING	345.00 Circuit 1	0.00"	
1.000	tran	14005	16107	"1 "	0	-1			
0									
tran_328				"Tran YAVAPAI		500.00 to YAVAPAI	230.00 Circuit 1YAVAP 1T	12.47"	
1.000	tran	14006	14234	"1 "	0	85906			
0									
tran_329				"Tran YAVAPAI		500.00 to YAVAPAI	230.00 Circuit 2YAVAP 3T	12.47"	
1.000	tran	14006	14234	"2 "	0	85907			
0									
tran_330				"Tran GILARIVR		500.00 to PANDA	230.00 Circuit 1	0.00"	
1.000	tran	14007	14238	"1 "	0	-1			
0									
tran_331				"Tran SNVLY		500.00 to SNVLY	230.00 Circuit 1	0.00"	
1.000	tran	14010	14265	"1 "	0	-1			
0									
tran_332				"Tran SNVLY		500.00 to SNVLY	230.00 Circuit 2	0.00"	
1.000	tran	14010	14265	"2 "	0	-1			
0									
tran_333				"Tran MORGAN		500.00 to RACEWAY	230.00 Circuit 2MOR2	34.50"	
1.000	tran	14011	14246	"2 "	0	85741			
0									
tran_334				"Tran MORGAN		500.00 to MORGAN	230.00 Circuit 1MOR1	34.50"	
1.000	tran	14011	14272	"1 "	0	85740			
0									
tran_335				"Tran PNP KAPS		500.00 to PPAPS W	230.00 Circuit 1PP W	34.50"	
1.000	tran	14016	14221	"1 "	0	85739			
0									
tran_336				"Tran PNP KAPS		500.00 to PPAPS E	230.00 Circuit 1PP E	34.50"	
1.000	tran	14016	14261	"1 "	0	85737			
0									
tran_337				"Tran PNP KAPS		500.00 to PPAPS N	230.00 Circuit 1PP N	34.50"	
1.000	tran	14016	14278	"1 "	0	85738			
0									
tran_338				"Tran CHOLLA		345.00 to CHOLLA	230.00 Circuit 1CHOLLA7T	12.50"	
1.000	tran	14100	14204	"1 "	0	85908			
0									
tran_339				"Tran CHOLLA		345.00 to CHOLLA	230.00 Circuit 2	0.00"	
1.000	tran	14100	14204	"2 "	0	-1			
0									
tran_340				"Tran FOURCORN		345.00 to FOURCORN	230.00 Circuit 1FOURCN4T	14.40"	
1.000	tran	14101	14211	"1 "	0	85909			
0									
tran_341				"Tran FOURCORN		345.00 to FOURCORN	230.00 Circuit 2FOURCN8T	14.40"	
1.000	tran	14101	14211	"2 "	0	85910			
0									
tran_342				"Tran PNP KAPS		345.00 to PPAPS C	230.00 Circuit 1PNPK 7T	14.40"	
1.000	tran	14102	14260	"1 "	0	85911			
0									
tran_343				"Tran PNP KAPS		345.00 to PPAPS E	230.00 Circuit 3PNPK T14	14.40"	
1.000									

tran	14102	14261	"3 "	0	14402			
0								
tran_344		"Tran PNPKAPS		345.00	to PPAPS N	230.00	Circuit 2PNPK T4	14.40"
1.000								
tran	14102	14278	"2 "	0	14403			
0								
tran_345		"Tran CORONADO		500.00	to CORONADO	345.00	Circuit 1	0.00"
1.000								
tran	15001	16100	"1 "	0	-1			
0								
tran_346		"Tran CORONADO		500.00	to CORONADO	345.00	Circuit 9B	0.00"
1.000								
tran	15001	16100	"9B"	0	-1			
0								
tran_347		"Tran KYRENE		500.00	to KYR-WEST	230.00	Circuit 6KYRENE6	34.50"
1.000								
tran	15011	14236	"6 "	0	15013			
0								
tran_348		"Tran KYRENE		500.00	to KYR-EAST	230.00	Circuit 7KYRENE7	34.50"
1.000								
tran	15011	15207	"7 "	0	15015			
0								
tran_349		"Tran KYRENE		500.00	to KYR-EAST	230.00	Circuit 8KYRENE8	34.50"
1.000								
tran	15011	15207	"8 "	0	15017			
0								
tran_350		"Tran PERKINS		500.00	to PERK PS1	500.00	Circuit 1	0.00"
1.000								
tran	15034	15031	"1 "	0	-1			
0								
tran_351		"Tran PERKINS		500.00	to PERK PS2	500.00	Circuit 1	0.00"
1.000								
tran	15034	15032	"1 "	0	-1			
0								
tran_352		"Tran SILVERKG		500.00	to SILVERKG	230.00	Circuit 1SILVERKG	34.50"
1.000								
tran	15041	15215	"1 "	0	15043			
0								
tran_353		"Tran BROWNING		500.00	to BROWNING	230.00	Circuit 1A	0.00"
1.000								
tran	15051	15222	"1A"	0	-1			
0								
tran_354		"Tran BROWNING		500.00	to BROWNING	230.00	Circuit 1B	0.00"
1.000								
tran	15051	15222	"1B"	0	-1			
0								
tran_355		"Tran RUDD		500.00	to RUDD	230.00	Circuit 1A	0.00"
1.000								
tran	15061	15230	"1A"	0	-1			
0								
tran_356		"Tran RUDD		500.00	to RUDD	230.00	Circuit 1B	0.00"
1.000								
tran	15061	15230	"1B"	0	-1			
0								
tran_357		"Tran RUDD		500.00	to RUDD	230.00	Circuit 3ARUDD3	23.00"
1.000								
tran	15061	15230	"3A"	0	15067			
0								
tran_358		"Tran RUDD		500.00	to RUDD	230.00	Circuit 3B	0.00"
1.000								
tran	15061	15230	"3B"	0	-1			
0								
tran_359		"Tran PINAL_C		500.00	to PINAL_C	230.00	Circuit 1	0.00"
1.000								
tran	15080	15231	"1 "	0	-1			
0								
tran_360		"Tran PINAL_C		500.00	to PINAL_C	230.00	Circuit 2	0.00"
1.000								
tran	15080	15231	"2 "	0	-1			
0								
tran_361		"Tran DUKE		500.00	to TESTTRAK	230.00	Circuit 1	0.00"
1.000								
tran	15087	19068	"1 "	0	-1			
0								
tran_362		"Tran PINAL_W		500.00	to PINALWES	345.00	Circuit 1	0.00"
1.000								
tran	15088	16114	"1 "	0	-1			
0								
tran_363		"Tran MESQUIT1		500.00	to MESQUITE	230.00	Circuit 1	0.00"
1.000								
tran	15094	15163	"1 "	0	-1			

0	tran_364	"Tran MESQUIT2	500.00 to MESQUITE	230.00 Circuit 2	0.00"
1.000	tran	15095 15163 "2 " 0	-1		
0	tran_365	"Tran TORTOLIT	500.00 to TORTOLIT	345.00 Circuit 1	0.00"
1.000	tran	16000 16115 "1 " 0	-1		
0	tran_366	"Tran WINCHSTR	345.00 to WINCHSTR	230.00 Circuit 1	0.00"
1.000	tran	16109 17105 "1 " 0	-1		
0	tran_367	"Tran COPPERVR	345.00 to COPPERVR	230.00 Circuit 1&2	0.00"
1.000	tran	16900 16901 "1 " 0	-1		
0	tran	16900 16901 "2 " 0	-1		
0	tran_369	"Tran BICKNELL	345.00 to BICKNELL	230.00 Circuit 1	0.00"
1.000	tran	17005 17004 "1 " 0	-1		
0	tran_370	"Tran GREEN-SW	345.00 to GREEN-SW	230.00 Circuit 1	0.00"
1.000	tran	17010 17009 "1 " 0	-1		
0	line 16903 17014	"1 " 1 1			
0	tran_371	"Tran MEAD S	230.00 to MEAD	287.00 Circuit 1	0.00"
1.000	tran	19012 26051 "1 " 0	-1		
0	tran_372	"Tran MEAD	345.00 to MEAD N	230.00 Circuit 1	0.00"
1.000	tran	19037 19011 "1 " 0	-1		
0	tran_373	"Tran MEAD	345.00 to MEAD N	230.00 Circuit 2	0.00"
1.000	tran	19037 19011 "2 " 0	-1		
0	tran_374	"Tran MEAD	500.00 to MEAD N	230.00 Circuit 1	0.00"
1.000	tran	19038 19011 "1 " 0	-1		
0	tran_375	"Tran MEAD	500.00 to MEAD N	230.00 Circuit 2	0.00"
1.000	tran	19038 19011 "2 " 0	-1		
0	tran_376	"Tran LIBERTY	345.00 to LIBTYPHS	230.00 Circuit 1	0.00"
1.000	tran	19053 19054 "1 " 0	-1		
0	tran_377	"Tran LIBTYPHS	230.00 to LIBERTY	230.00 Circuit 2	0.00"
1.000	tran	19054 19052 "2 " 0	-1		
0	tran_378	"Tran PEACOCK	345.00 to PEACOCK	230.00 Circuit 1	0.00"
1.000	tran	19315 19314 "1 " 0	-1		
0	tran_379	"Tran N.GILA	500.00 to N.GILA	230.00 Circuit 1N.GIL7T	34.50"
1.000	tran	22536 14267 "1 " 0	85795		
0	tran_380	"Tran GLEN PS	230.00 to GLENCANY	230.00 Circuit 1	0.00"
1.000	tran	79028 79031 "1 " 0	-1		
0	tran_381	"Tran GLENCANY	345.00 to GLENCANY	230.00 Circuit 1	0.00"
1.000	tran	79032 79031 "1 " 0	-1		
0	tran_382	"Tran GLENCANY	345.00 to GLENCANY	230.00 Circuit 2	0.00"
1.000	tran	79032 79031 "2 " 0	-1		
0	tran_383	"Tran PINPKBRB	345.00 to PINPK	230.00 Circuit 1	0.00"
1.000	tran	79053 19062 "1 " 0	-1		
0	tran_384	"Tran PINPKBRB	345.00 to PINPK	230.00 Circuit 2	0.00"
1.000					

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tran      79053      19062  "2 " 0      -1
0
tran_385      "Tran PINPKBRB      345.00 to PINPK      230.00 Circuit 3      0.00"
1.000
tran      79053      19062  "3 " 0      -1
0
tran_386      "Tran SHIP PS      230.00 to SHIPROCK      230.00 Circuit 1      0.00"
1.000
tran      79061      79063  "1 " 0      -1
0
tran_387      "Tran SHIP PS      230.00 to SHIPROCK      230.00 Circuit 2      0.00"
1.000
tran      79061      79063  "2 " 0      -1
0
tran_388      "Tran SHIPROCK      345.00 to SHIPROCK      230.00 Circuit 1SHKULAT      24.00"
1.000
tran      79064      79063  "1 " 0      79513
0
line_389      "Sun Valley - Hassay AZ 230" 1.000
line 14265 17173 "1 " 1 0
0
line_390      "Browning-Rogers 230" 1.000
line 15222 15212 "1 " 1 0
0
line_4000      "Line BUCKEYE to LIBERTY OUT & CLOSE BK TIE" 1.000
line 14201      19052  "1 " 1 0
line 14201      14213  "1 " 1 1
0
line_4001      "Line MEADOWBOOK-SUNNYSLOPE 230KV W/SS 230/69 XFMR #3 OUT" 1.000
line 14218      14227  "1 " 1 0
tran 14227      84095  "1 " 0      85956
0
line_4002      "Line LONE PEAK-SUNNYSLOPE 230KV W/SS 230/69 XFMR #1 OUT" 1.000
line 14217      14227  "1 " 1 0
tran 14227      84096  "1 " 0      85955
0
line_4003      "Line DEERVALY to PINPKSRP 230KV W/DV 230/69 XFMR #10 OUT" 1.000
line 14207      15211  "1 " 1 0
tran 14207      84124  "2 " 0      85959
0
line_4004      "Line DEERVALY to WESTWNGE 230KV W/DV 230/69 XFMR #6 OUT" 1.000
line 14207      14259  "1 " 1 0
tran 14207      84020  "1 " 0      85958
0
line_4005      "Line MEADOWBROOK-COUNTY CLUB 230KV W/ME 230/69 XFMR #9 AND CC 230/69 XFMR #6"
1.000
line 14218      14206  "1 " 1 0
tran 14218      84063  "1 " 0      85969
tran 14516      84015  "1 " 0      85970
0
line_4006      "Line SURPRISE to EL SOL 230KV W/ES 230/69 XFMR #4" 1.000
line 14228      14210  "1 " 1 0
tran 14210      84315  "1 " 0      85964
0
line_4007      "Line SURPRISE to WESTWNGW 230KV W/SC 230/69 XFMR #12 OUT" 1.000
line 14228      14231  "1 " 1 0
tran 14228      84353  "1 " 0      85962
0
line_4008      "Line NO GLENDALE BREAKER - COUNTRY CLUB - GLENDALE 230KV W/CC 230/69 XFMR #8 OUT"
1.000
line 14206      14270  "1 " 1 0
line 14270      14212  "1 " 1 0
line 14212      14248  "1 " 1 0
line 14248      15201  "1 " 1 0
tran 14206      84016  "1 " 0
0
line_4009      "Line WILOWLKW to PRESCOTT 230KV W/WL 230/69 XFMR #10 OUT" 1.000
line 14250      19106  "1 " 1 0
tran 14250      84648  "1 " 0      85924
0
line_4010      "Tran WESTWING 500/230 #1 & close WW 230 TIE" 1.000
tran 14005      14259  "1 " 0      14408
line 14231      14259  "1 " 1 1
0
line_4013      "Line EL SOL - WHITE TANKS 230KV W/ES 230/69 XFMR #12" 1.000
line 14210      14232  "1 " 1 0
tran 14210      84316  "1 " 0      85963
0
line_4014      "Line CASA GRANDE - DESERT BASIN 230KV W/CG 230/12 XFMR #3" 1.000
line 15235      14203  "1 " 1 0
tran 14203      85835  "1 " 0      85958

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0
line_4015      "Line CASA GRANDE - MILLIGAN 230KV W/CG 230/69 XFMR #2"   1.000
  line      14203      14271      "1 "      1 0
  tran      14203      84848      "1 "      0      85936
0
line_4016      "Line VERDE N - YAVAPAI 230KV W/VR 230/69 XFMR #10"   1.000
  line      14230      14234      "1 "      1 0
  tran      14230      84645      "1 "      0      85926
0
line_4017      "Line VERDE S - COCONINO 230KV W/VR 230/69 XFMR #3"   1.000
  line      14205      14247      "1 "      1 0
  tran      14247      84645      "1 "      0      85927
0
line_4018      "Line MAZATZAL - PINNACLE PEAK 345KV W/PP 345/230 XFMR #7"   1.000
  line      14102      14107      "1 "      1 0
  tran      14102      14260      "1 "      0      85911
0
line_4019      "Line PINNACLE PEAK - PREACHER CANYON 345KV W/PP 345/230 XFMR #4"   1.000
  line      14102      14103      "1 "      1 0
  tran      14102      14278      "2 "      0      14403
0
line_4020      "Prescott (aka Willow Lake) 115 kV (Substation) Outage"   1.000
  isol 14544
  isol 14543
0
line_4021      "Breaker to Breaker Marana Outage"   1.000
  line      14356      17013      "1 "      1 0
  line      17012      17013      "1 "      1 0
  line      17013      19210      "1 "      1 0
  line      19210      19064      "1 "      1 0
0
end
# End of Contingency List, 388 Contingencies Added to List

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Appendix B: Contingency Results

2015 Ten Year Snapshot - 2025 Heavy Summer - Voltage Concerns

NUMBER	NAME	KV	AREA	ZONE	CONTINGENCY IDENTIFIER	CONTINGENCY DESCRIPTION	2025base	2025APS01	2025APS02	2025No_BRG-CL_ST-ROS	2025-No_RS-28
16903	PD-MORN	230	14	164	base	Base system (n-0)	0.949	0.949	0.95	0.949	0.949

NUMBER	NAME	KV	AREA	ZONE	CONTINGENCY IDENTIFIER	CONTINGENCY DESCRIPTION	2025base	2025AP801	2025AP802	2025No_BRG-CL_ST-ROS	2025-No_RS-28
17018	REDTAIL	230	14	171	line_200	Line APACHE 230.0 to REDTAIL 230.0 Circuit 1	-0.08	-0.08	-0.079	-0.08	-0.08

FROM NO.	FROM NAME	FROM RV	TO NO.	TO NAME	TO RV	CK ID	AREA	SOME	CONTINGENCY IDENTIFIER	CONTINGENCY DESCRIPTION	RATING NUMBER USED	RATING VALUE USED	RATING UNIT	2015Data	2025AP01	2025AP02	2025No. BRD-CL, ST-ROS	2025-No. RS-28
14356	SAG EAST	115	17013	MARANATP	115	1	14	181	shh 182	Line GREENLEE 345.0 to WILLOW 345.0 Circuit 1	2	150	MVA	1.885	1.085	1.085	1.085	1.085
14356	SAG EAST	115	17013	MARANATP	115	1	14	181	shh 187	Line SPRINGER 345.0 to GREENLEE 345.0 Circuit 1	2	150	MVA	1.885	1.085	1.085	1.085	1.085
14356	SAG EAST	115	17013	MARANATP	115	1	14	181	shh 188	Line SPRINGER 345.0 to WALL 345.0 Circuit 1	2	150	MVA	1.887	1.087	1.087	1.087	1.087
14356	SAG EAST	115	17013	MARANATP	115	1	14	181	shh 192	Line WINCHITE 345.0 to WILLOW 345.0 Circuit 1	2	150	MVA	1.871	1.071	1.071	1.071	1.071
14356	SAG EAST	115	17013	MARANATP	115	1	14	181	shh 195	Line PINALWES 345.0 to SOUTH 345.0 Circuit 1	2	150	MVA	1.158	1.158	1.158	1.158	1.158
14356	SAG EAST	115	17013	MARANATP	115	1	14	181	shh 199	Line APACHE 230.0 to BUTTERFLD 230.0 Circuit 1	2	150	MVA	1.821	1.021	1.021	1.021	1.021
17013	MARANATP	115	17012	MARANA	115	1	14	171	shh 195	Line PINALWES 345.0 to SOUTH 345.0 Circuit 1	2	150	MVA	1.841	1.041	1.041	1.041	1.041
17022	THREEPNT	115	17089	INDARIO	115	1	14	171	shh 195	Line PINALWES 345.0 to SOUTH 345.0 Circuit 1	2	93	MVA	1.839	1.039	1.037	1.036	1.036

CONTINGENCY IDENTIFIER	CONTINGENCY DESCRIPTION	2025base	2025APS01	2025APS02	2025No_BRG-CL_ST-ROS	2025-No_RS-28
line_4021	Breaker to Breaker Marana Outage	Not Solved	Not Solved	Not Solved	Not Solved	Not Solved